Pond Sealing or Lining (number)

Definition

Installing a fixed lining of impervious material or treating the soil in a pond mechanically or chemically to impede or prevent excessive water loss.

Scope

This standard applies to the sealing of ponds by the use of flexible membrane linings made of asphalt-sealed fabric.

Purpose

To reduce seepage losses in ponds to an acceptable level.

Conditions where practice applies

This practice applies where water loss from a pond through leakage is, or will be, of such proportion as to prevent the pond from fulfilling its planned purpose, or where leaking will damage land and crops or cause loss of unacceptable amounts of water or environmental problems.

Planning considerations

Water Quantity

1. Effects on the water budget, especially effects on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.

2. Variability of the practice's effects caused by seasonal or climatic changes.

3. Effects on downstream flows or aquifers that would affect other water uses.

4. Effects on the volume of downstream flow to prohibit undesirable environmental, social or economic effects.

5. Potential use for water management.

Water Quality

1. Effects on the movement of sediment, pathogens, and soluble material carried by seepage water.

2. Effects on the trapping of nutrients and pesticides and altering their effect on surface and ground water quality.

3. Effects on the visual quality of downstream water resources.

4. Short-term and construction-related effects on the quality of the pool and downstream water.

5. Effects of water level control on the temperatures of pool and downstream water to prevent undesired effects on aquatic and wildlife communities.

6. Effects on wetlands or water-related wildlife habitats associated with the practice.

Design criteria

Ponds to be lined shall be constructed to meet the SCS standards for irrigation pits or regulating reservoirs (552), irrigation storage reservoirs (436), ponds (378), waste treatment lagoons (359), waste storage ponds (425), or wildlife watering facilities (648), as appropriate.

The flexible membranes to be used as linings shall be constructed of high-quality materials and shall be certified by the manufacturer to be suitable for this use. Base material used for asphalt-sealed liners shall be highly resistant to bacteriological deterioration. Livestock shall be excluded from the site to prevent damage to the lining.

Plans and specifications

Plans and specifications for sealing ponds with asphalt-sealed fabric liners shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

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Asphalt-Sealed Fabric Liner Specifications

Subgrade preparation. The area to be lined shall be drained and allowed to dry until the surface is firm and can support the workers and equipment that must travel over it during installation of the lining.

All banks and fills in the area to be lined must be sloped not steeper than 1 to 1 for exposed lining and 2-1/2 horizontal to 1 vertical for buried linings.

The foundation area shall be smooth and free of projections that can damage the lining. Stumps and roots shall be removed. Rocks, hard clods, and other such materials shall be removed, rolled so as to provide a smooth surface, or covered with a cushion of fine soil.

If needed, an effective sterilant shall be applied to the subgrade at the rate recommended by the manufacturer.

An anchor trench shall be excavated around the area to be lined at the planned elevation of the top of the lining. The trench shall be 8 to 10 in. deep and about 12 in. wide.

All lining material shall be free of damage or defect. Each package delivered to the job site shall bear the name of the material, the manufacturer's name or symbol, the quantity therein, and the thickness or weight of the material.

Placement

The liner shall be fabricated on-site to the shape of the basin according to the manufacturer's instructions. Joints shall be machine stitched with heavy-duty, inert, synthetic fiber thread.

The fabric shall be unrolled so that the unfused side is up after installation. Joints shall be made by placing two widths of the fabric together, one directly on top of the other, aligning the edges and seaming at least 1 in. away from the fabric edge. The top layer of the fabric shall then be unfolded so that the seam edge is beneath the liner. The jointing operation shall be continued until the entire liner is completed.

Attachments to any pipe projecting through the lining shall consist of boots fabricated of the lining material, slipped over the projecting pipe, bonded to the pipe with mastic, and hand stitched or machine stitched to the liner. Attachments to concrete, and similar structures shall be sealed with mastic and fastened with a batten strip.

Liner edges shall be trimmed and a minimum of 12 in. of fabric placed in the perimeter anchor trench. Trenches shall be backfilled only enough to secure the edges.

When the polypropylene fabric is in place, it shall be sealed by spraying it with the following proportioned mixture of sealant:

Anionic asphalt emulsion SS-1h	100 gal
Asbestos fiber 7M-02	60 lbs
Water	44 gal
Wetting agent (Phillips or equivalent)	2 lbs

The water and wetting agent shall be mixed in a tank or a suitable container. The asbestos shall be added and mixed. The asphalt emulsion shall then be added and thoroughly mixed.

The sealant temperature shall not exceed 200 degrees F when applied. The ambient air temperature shall be 45 degrees F or higher to insure sealant cure. Two coats of sealant mix shall be applied to the liner at a rate of 0.7 gal/yd^2/coat. Each coat shall be allowed to cure sufficiently so that it is not tacky before applying the next coat or placing the liner in service. Trench edges shall be sprayed a minimum of 6 in. below grade.

After curing is completed, the anchor trenches shall be backfilled and compacted.

Safety

Workers exposed to asbestos material shall comply with the Occupational Safety and Health Act and Environmental Protection Agency regulations concerning handling and use of asbestos material.

Materials

Anionic asphalt emulsion SS-1h shall be used. All membranes shall meet or exceed the requirements in Table 1. Minimum thickness is 100 mils.

Table 1.—Required characteristics of asphalt-sealed fabric liners

Test description	Requirement	Test method
Fabric material	95 pct polypropylene staple	—
Fabric structure	Nonwoven and fused on one side	—
Fabric weight, oz/yd²	5.0	—
Fabric maximum pore diameter, μm	500	ASTM-E-128
Asphalt sealant-R&B softening point, deg F	200	ASTM-D-36 (Solvent Extraction)
Weight of asbestos fibers 7M-02 in cured sealant, pct, by weight	10	
Ductility of cured sealant, cm	5	ASTM-D-113
Minimum weight of asbestos asphalt residual, lb/yd²	3.5	ASTM-D-113
Minimum membrane thickness, mil	100	ASTM-D-113
Minimum membrane specific gravity	1.0 (air evacuated from fabric)	ASTM-D-113
Breaking strength, either direction, lb	50	ASTM-D-1682
Elongation, either direction, pct	80	ASTM-D-1682
Joint strength, pct of tensile, pct	100	ASTM-D-1682
Tear resistance (notched sample in tension), lb	20	ASTM-D-1004—Die C
Elmendorf tear resistance, g	3200	ASTM-D-1922
Puncture resistance, lb	64	[1] USDA-ARS
Hydrostatic burst-Mullen, lb/in.²	200	[2] ASTM-D-751
Hydraulic testing, 35-ft head	No water loss	Pressure Cell

[1] A 3/8-in. sphere forced into membrane at 10 in./min. Pounds force at rupture is recorded.

[2] A 6-in. diameter placed in pressure cell. One side of the sample, reinforced by 1/4-in. mesh screen, is open to air. Water under pressure equivalent to a 35-ft water depth (15 lb/in.²) at 100 deg F is applied to the other side for 7 days. Observe for water loss through the membrane.